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Synthesis, Transport, and Ionophoric Properties of α,ω-Biphosphorylated Azapodands: X.[1] Membrane Transport of Organic Acids by Phosphorylated α,ω-Diazapodands

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Abstract—The membrane transport properties of novel phosphorylated azapodands with respect to mono- and polyfunctional carboxylic acids were studied. The structures of the transported H-complexes are discussed, the complexing centers in the carriers are considered, and the correlations between the structure and transmembrane transport efficiency of the acid substrates are demonstrated.

Keywords: membrane transport, organic substrates, phosphorylated diazapodands
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The host-guest chemistry forms the basis for the development of new high technologies, such as analytical applications of ion-selective electrodes, membrane transport, targeted synthesis of biologically active compounds, highly efficient catalysts, etc. Therefore, search for the search for new efficient and selective hosts for host-guest complexes is an urgent task for chemistry and technology. This task is best approached by the targeted synthesis of potential hosts with preset complexing properties toward suggested substrates. Linear analogs of crown ethers—podands, with terminal phosphoryl groups, whose synthesis and practical applications are well reported [2–8], seem to be highly promising reagents in this respect.

Podands modified by functional groups with different structures and properties act as efficient complexing agents for alkali and alkaline earth metal cations [9–11]. Therewith, of particular interest are compounds bearing strongly electron-donor groups, for example, quinolyl, *ortho*-carboxyphenyl, or phosphoryl-containing groups. The electron-donor power of the latter groups can be varied by introducing different substituent to the phosphorus atom, which allows one to control host-guest interactions, for example, the selectivity of binding the substrate to specific complexing sites [12, 13]. Furthermore, the complexing properties of podands depend on the length of the polyether chain, which is responsible for the total dentacity of the ligand and its conformational lability, as well as on the terminal groups at this linker. Rigid terminal groups (for example, aromatic) containing potential donor centers at the oligo(ethylene glycol) fragments favor higher stability of metal complexes of such compounds. As mentioned above, podands with phosphoryl terminal groups are of particular interest, because the phosphoryl oxygen atom, which is a much stronger electron donor than the ether oxygen atom, can ensure preferential coordination of the terminal fragments of such ligands and their key role in the selectivity of extraction [12, 14].

In the series of our previous works [15–20] we described the methods of synthesis of azapodands with phosphoryl terminal groups and their ionophoric, extraction, and membrane transport properties with respect to various substrates. In order to better understand into the relationship between the structure of polyfunctional aminophosphoryl carriers and their

[1] For communication IX, see [1].